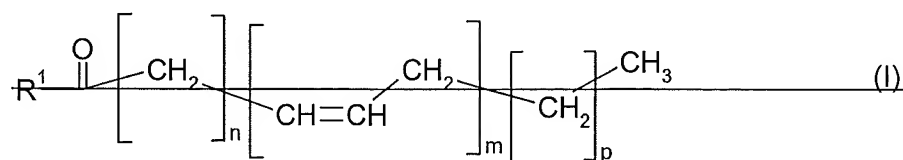


AMENDMENTS TO THE CLAIMS

Listing of Claims:

1. (Currently amended) A process for production of compounds comprising one or more C18-, C20-, and/or C22-polyunsaturated fatty acids of the general formula I

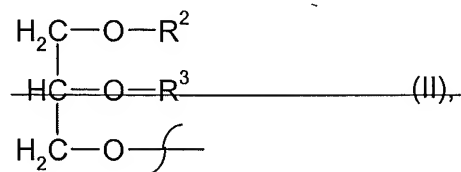


in a transgenic organism with a content of at least 1% by weight of these compounds based on the total lipid content of the transgenic organism, which comprises the following process steps comprising:

- a) introducing, into an organism, at least one nucleic acid sequence which encodes an ω -3-desaturase that is capable of desaturating C20- or C22-fatty acids, and
- b) culturing the organism under conditions which permits the production of one or more C18-, C20-, and/or C22-polyunsaturated fatty acids, compounds of the general formula I, and

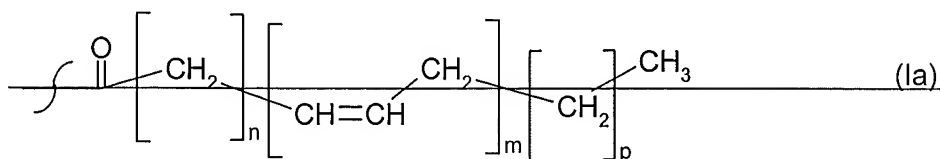
where the variables and substituents in formula I have the following meanings:

$\text{R}^1 =$ —hydroxyl, coenzyme A (thioester), lysophosphatidyletholine, lysophosphatidylethanolamine, lysophosphatidylglycerol, lysodiphosphatidylglycerol, lysophosphatidylserine, lysophosphatidylinositol, sphingo base or a radical of the formula II



$\text{R}^2 =$ —hydrogen, lysophosphatidyletholine, lysophosphatidylethanolamine, lysophosphatidylglycerol, lysodiphosphatidylglycerol, lysophosphatidylserine, lysophosphatidylinositol or saturated or unsaturated $\text{C}_2\text{-C}_{24}$ -alkylcarbonyl,

R^3 = ~~hydrogen, saturated or unsaturated C_2 - C_{24} -alkylcarbonyl, or R^2 and R^3~~
~~independently of one another are a radical of the formula Ia:~~



$n = 2, 3, 4, 5, 6, 7$ or 9 , $m = 2, 3, 4, 5$ or 6 and $p = 0$ or 3

wherein the ω -3-desaturase is encoded by a nucleic acid sequence comprising:

- i) the nucleic acid sequence of SEQ ID NO: 1,
- ii) a nucleic acid sequence encoding the amino acid sequence of SEQ ID NO: 2,
- iii) a nucleic acid sequence having at least 95% identity with the nucleic acid sequence of SEQ ID NO: 1, or
- iv) a nucleic acid sequence encoding an amino acid sequence having at least 95% identity with the amino acid sequence of SEQ ID NO: 2.

2 (Currently amended) The process according to claim 1, ~~wherein in addition to the nucleic acid sequence introduced in item a), which codes for an ω -3-desaturase activity,~~ further comprising introducing into the organism at least one nucleic acid sequences which code sequence coding for a polypeptide[[s]] with Δ 9-elongase, Δ 6-desaturase, Δ 8-desaturase, Δ 6-elongase, Δ 5-desaturase, Δ 5-elongase or Δ 4-desaturase activity ~~are introduced.~~

3. (Cancelled)

4. (Currently amended) The process according to claim 1, wherein the ~~substituents R^2 or R^3~~ independently of one another are unsaturated C_{18} -, C_{20} - or C_{22} -alkylcarbonyl with one or more C_{18} -, C_{20} -, and/or C_{22} -polyunsaturated fatty acids have at least two double bonds.

5. (Previously presented) The process according to claim 1, wherein the transgenic organism is a transgenic microorganism or a transgenic plant.

6. (Previously presented) The process according to claim 1, wherein the transgenic organism is an oil-producing plant, a vegetable producing plant, or an ornamental plant.

7. (Previously presented) The process according to claim 1, wherein the transgenic organism is a transgenic plant selected from the group of the plant families Adelotheceaceae, Anacardiaceae, Asteraceae, Apiaceae, Betulaceae, Boraginaceae, Brassicaceae, Bromeliaceae, Caricaceae, Cannabaceae, Convolvulaceae, Chenopodiaceae, Crypthecodiniaceae, Cucurbitaceae, Ditrichaceae, Elaeagnaceae, Ericaceae, Euphorbiaceae, Fabaceae, Geraniaceae, Gramineae, Juglandaceae, Lauraceae, Leguminosae, Linaceae or Prasinophyceae.
8. (Currently amended) The process according to claim 1, wherein the ~~compounds of the general formula I~~ one or more C18-, C20-, and/or C22-polyunsaturated fatty acids are isolated from the organism in the form of their oils, lipids or free fatty acids.
9. (Currently amended) The process according to claim 1, wherein the ~~compounds of the general formula I~~ one or more C18-, C20-, and/or C22-polyunsaturated fatty acids are isolated in a concentration of at least 5% by weight based on the total lipid content of the transgenic organism.
- 10-24. (Cancelled)
25. (Previously presented) The process according to claim 1, wherein the ω -3-desaturase is capable of desaturating C20-fatty acids.
26. (Currently amended) The process according to claim 1, wherein the ω -3-desaturase is capable of desaturating C18-, C20- and C22-fatty acids.
27. (New) A process for increasing the content of C18-, C20- and/or C22-polyunsaturated fatty acids in oils, lipids, or fatty acids in an organism comprising:
- a) introducing, into an organism, at least one nucleic acid sequence which encodes an ω -3-desaturase that is capable of desaturating C20- or C22-fatty acids, and
 - b) culturing the organism under conditions which permits the production of C18-, C20- and/or C22-polyunsaturated fatty acids
- wherein the ω -3-desaturase is encoded by a nucleic acid sequence comprising:
- i) the nucleic acid sequence of SEQ ID NO: 1,
 - ii) a nucleic acid sequence encoding the amino acid sequence of SEQ ID NO: 2,

iii) a nucleic acid sequence having at least 95% identity with the nucleic acid sequence of SEQ ID NO: 1, or

iv) a nucleic acid sequence encoding an amino acid sequence having at least 95% identity with the amino acid sequence of SEQ ID NO: 2.

28. (New) The process according to claim 27, further comprising introducing into the organism at least one nucleic acid sequence coding for a polypeptide with $\Delta 9$ -elongase, $\Delta 6$ -desaturase, $\Delta 8$ -desaturase, $\Delta 6$ -elongase, $\Delta 5$ -desaturase, $\Delta 5$ -elongase or $\Delta 4$ -desaturase activity.

29. (New) The process according to claim 27, wherein the C18-, C20- and/or C22-polyunsaturated fatty acids have at least two double bonds.

30. (New) The process according to claim 27, wherein the transgenic organism is a transgenic microorganism or a transgenic plant.

31. (New) The process according to claim 27, wherein the transgenic organism is an oil-producing plant, a vegetable producing plant, or an ornamental plant.

32. (New) The process according to claim 27, wherein the transgenic organism is a transgenic plant selected from the group of the plant families Adelotheceaceae, Anacardiaceae, Asteraceae, Apiaceae, Betulaceae, Boraginaceae, Brassicaceae, Bromeliaceae, Caricaceae, Cannabaceae, Convolvulaceae, Chenopodiaceae, Crypthecodiniaceae, Cucurbitaceae, Ditrichaceae, Elaeagnaceae, Ericaceae, Euphorbiaceae, Fabaceae, Geraniaceae, Gramineae, Juglandaceae, Lauraceae, Leguminosae, Linaceae or Prasinophyceae.

33. (New) The process according to claim 27, further comprising isolating the oils, lipids, or fatty acids from the organism.

34. (New) The process according to claim 27, wherein the ω -3-desaturase is capable of desaturating C20-fatty acids.

35. (New) The process according to claim 27, wherein the ω -3-desaturase is capable of desaturating C18-, C20- and C22-fatty acids.

36. (New) A process for production of compounds comprising one or more C18-, C20-, and/or C22-polyunsaturated fatty acids in a transgenic organism comprising:

a) introducing into an organism, at least one nucleic acid sequence which encodes an ω -3-desaturase that is capable of desaturating C22:4 ω -6-fatty acid to C22:5 ω -3-fatty acid, and

b) culturing the organism under conditions which permits the production of one or more C18-, C20-, and/or C22-polyunsaturated fatty acids.

37. (New) The process according to claim 36, wherein the one or more C18-, C20-, and/or C22-polyunsaturated fatty acids have at least two double bonds.

38. (New) The process according to claim 36, wherein the transgenic organism is a transgenic microorganism or a transgenic plant.